SIEMENS

FM 458-1 DP

Function Blocks

Manual

Edition 02.2004

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Safety guidelines

This Manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the Manual by a warning triangle and are marked as follows according to the level of danger:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTICE used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesireable result or state.

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We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Editions

FM 458-1 DP

Manual

Function Blocks

Edition 02.2004

NOTE

Please note that the current edition of this documentation contains different editions of the individual chapters. The following overview tells you when a chapter was revised the last time.

Overview (chapter editions)

Chapter		Edition
	Foreword	Edition 12.2003
1	Input/output blocks	Edition 03.2003
2	Communication blocks	Edition 03.2003
3	Logic blocks	Edition 03.2003
4	Service-/diagnostic blocks	Edition 03.2003
5	SIMOLINK drive coupling	Edition 02.2004
6	Closed-loop control blocks	Edition 12.2003

Foreword

Purpose of this Manual

This Manual explains the principle use and functions of the STEP 7 automation software with the main focus on the appropriate technological and drive control components T400, FM 458-1 DP, SIMADYN D, SIMATIC TDC or D7-SYS.

Basic knowledge required

This Manual addresses programmers and commissioning engineers. General knowhow regarding automation technology is required in order to understand the contents of the Manual

Validity of the Manual

This Manual is valid for SIMATIC D7-SYS Version 6.1.

Additional support

If you have questions relating to the use of the products described in the Manual, which cannot be answered here, then please contact your local Siemens office. You can also call the Hotline:

- **Tel.:** +49(9131) 98-5000
- **Fax:** +49(9131) 98-1603
- **e-mail:** adsupport@siemens.com

Training Center

Appropriate training courses are available in order to make it easier to get to know the SIMADYN D automation system. Please contact the central Training Center in D-Erlangen (I&S IS INA TC):

- **Tel.:** +49(9131) 7-27689, -27972
- **Fax:** +49(9131) 7-28172
- **Internet:** www.siemens.de/sibrain
- **Intranet:** http://info-tc.erlm.siemens.de/

NOTE

This user part of the Manual does not include any detailed information/instructions with individual descriptions, but is only intended to provide a basic procedure. More detailed information on the dialog boxes in the software and how they are handled is provided in the appropriate online help.

Information overview

This manual is part of the overall documentation for the technological and drive control components T400, FM 458, SIMADYN D, SIMATIC TDC and SIMATIC D7-SYS:

Title	Content
System and communications configuring D7-SYS	**The first project in a few steps** This Section provides an extremely simple entry into the methodology when assembling and programming the SIMATIC TDC/SIMADYN D control system. It is especially conceived for first-time users of a control system. **System software** This Section provides basic know-how about the structure of the operating system and an application program of a CPU. It should be used to obtain an overview of the programming methodology, and basis for configuring user programs. **Communications configuring** This section provides you with basic know-how about the communication possibilities and how you configure links to the communication partners. **Changeover from STRUC V4.x to D7-SYS** Essential features are included in this section, which have changed over STRUC V4.x with the introduction of SIMATIC D7-SYS.
STEP 7 option packages for D7-SYS	**Basis software** This section explains the essential use and the functions of the STEP 7 automation software. For first users, it provides an overview on configuring, programming and commissioning a station. When working with the basis software, you can access the online help which provides you with support when it comes to detailed questions on using the software. **CFC** The CFC language (Continuous Function Chart) allows you to graphically interconnect blocks. When working with the particular software, you can also use the online help which can answer detailed questions regarding the use of the editors/compiler. **SFC** Configuring sequence controls using SFC (Sequential Function Chart) of SIMATIC S7. In the SFC editor, you generate a sequence chart using graphic resources. The SFC elements of the chart are then positioned according to specific rules.
Hardware	The complete hardware spectrum is described as reference in this Manuals.
Function blocks	These Reference Manuals provide you with an overview of selected function blocks for the associated technological and drive control components T400, FM 458-1 DP, SIMADYN D and SIMATIC TDC.

Guide

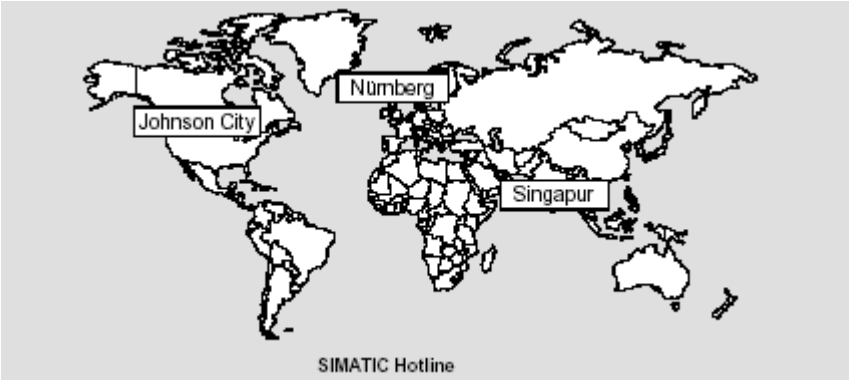
As first time user, we recommend that this Manual is used as follows:

- Please read the first section on using the software in order to get to know some of the terminology and basic procedure.
- Then use the particular sections of the Manual if you wish to carry-out certain processing steps (e.g. loading programs).

If you have already executed a small project, and have gained some experience, then you can read individual sections of the Manual in order to get up to speed about a specific subject.

Automation and Drives, Service & Support

Can be accessed globally at any time of the day:



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1 Input/output blocks

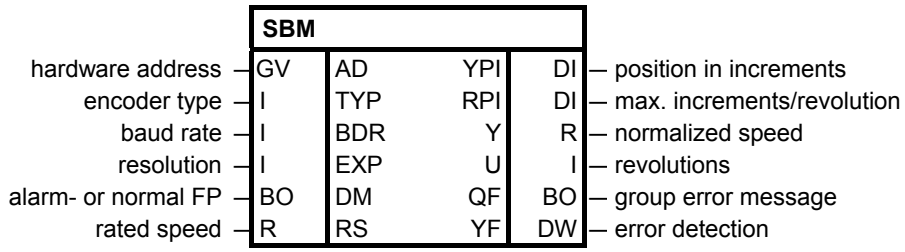
Assignment of the input/output blocks to processor- and peripheral devices.

Blocks	Modules										
	PM5	PM6	T400	IT41	IT42	EA12	EB11	FM 458	EXM 438	EXM 448*)	ITSL*)
SBM										x	x

*) with SBM2 Module

1.1 SBM Rotary encoder block

Symbol



Brief description

The SBM function block is used to realize the following tasks:

- Initialize the rotary encoder, which is connected at the SBM2 module
- Determine the position and speed from the encoder data
- Error handling when communication errors develop between the encoder and SBM2 module

Mode of operation

During the initialization phase of the system, the initialization I/O are read and the appropriate mode set at the SBM2 module. The following settings are made for the EQN1325 encoder:

- The encoder power supply is set to 5 V
- Number of revolutions to 4096
- Signal periods per revolution 8192

After the mode has been set, the zero position is determined, and the starting values for the position and the speed output at the connections.

In the standard mode, the block can assume four different statuses:

- NRM
  The values read-out from the SBM2 module (position and speed) are displayed at the block connections. If an error is detected, the block goes into the ERR error condition.
- ERR
  The following errors can occur in operation:
- Encoder is defective or is not connected
- Encoder was disconnected
- Data transfer error for serial communications between the encoder and SBM2 module
- SBM2 module not available

  In the first three cases, the block goes into the "INI“ initialization status and in the latter case into the "OFF" status.

- INI
  as for the "initialization phase“ mode
- OFF
  Output QF is set and processing terminated.

I/O

AD	Hardware address of the SBM2	(initialization input)
TYP	Encoder type TYP = 0 not available TYP = 1 EQN1325 TYP > 1 incorrect encoder type	(initialization input default: 1)
BDR	Baud rate BDR = 0 100 kHz BDR = 1 500 kHz BDR = 2 1 MHz BDR = 3 2 MHz BDR > 3 incorrect baud rate	(initialization input default: 0)
EXP	Resolution in bits Value range: 16 ≤ EXP ≤ 32	(default: 23)
DM	Configure the block in cyclic tasks or interrupt tasks DM=0 SBM in interrupt tasks If the block is computed in interrupt tasks, then the SBM2 module register is read-out with a falling edge on the SYNC_DNE line. This signal also generates the interrupt for the interrupt task in which the block is configured. The contents of the register are then read-out and the values for the output connections computed. DM=1 SBM in cyclic tasks If the block is computed in cyclic tasks, then the SBM2 module register is read-out in the system mode. The contents of the register are then read-out in the normal mode and the values for the output connections computed.	(initialization input default: 0)
RS	Rated speed in revolution/min (RS>0)	(default: 1.0)
YPI	Position in increments	(default: 0)
RPI	Max. number of increments per revolution (depending on the input connection EXP)	(default: 0)
Y	Normalized speedform the rotary encoder $\frac{\text{RPMmin}}{\text{RS}}$	(default: 0.0)
U	Revolutions	(default: 0)
QF	Group error message QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)
YF	Error status of the block YF=0x0000 no error, YF>0x0000 (refer to error statuses)	(default: 16#0000 0000)

Error statuses

Value	Significance
Nibble 1	
0x0001	Initialization mode
0x0002	No SBM2 module available
0x0004	SBM2 module is processed from another SBM
0x0008	Encoder defective/not available
Nibble 2	
0x0010	Unknown carrier module code
0x0020	Incorrect hardware address
0x0040	Encoder fault/error → Check the hardware (encoder, cable etc.)
0x0080	No voltage or short-circuit
Nibble 3	
0x0100	No data transfer from or to the encoder → check the hardware (encoder, cable etc.)
0x0200	Erroneous data transfer from or to the encoder → check the hardware (encoder, cable etc.)
0x0400	Invalid mode parameterized
0x0800	Invalid encoder parameterized
Nibble 4	
0x1000	Invalid speed normalization parameterized
0x2000	Invalid baud rate parameterized
0x4000	Sampling time too high; speed computation not possible →Sampling time: ≤ 4.0 ms
0x8000	Error for the request to save
Nibble 5	
0x10000	Invalid resolution parameterized
0x20000	Not defined: Reserve → Default: 0
0x40000	Not defined: Reserve → Default: 0
0x80000	Not defined: Reserve → Default: 0
Nibble 6-8	Not defined: Reserve → Default: 0

Configuringdata

Computation time [µs]	FM 458-1 DP 13,2
Can be inserted online	No
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	Can only be used with an EQN 1325 encoder

2 Communication blocks

2.1 Central coupling blocks

NOTE Additional information on this group of function blocks, e.g. symbol, mode of operation, I/O and technical data are provided in the online help for the particular block.

2.1.1 @CSL2F PROFIBUS FMS coupling central block

Brief description

- the function block initializes and monitors the PROFIBUS FMS coupling (CS7 and SS5 module).
- the function block may only be configured in the sampling interval 32ms <= TA <= 255ms and only in the communications FP "Transmit". Otherwise, an entry is made in the communications error field.

2.1.2 @CSL2L PROFIBUS FDL central block

Brief description

- the function block initializes and monitors the PROFIBUS FDL coupling (CS7 and SS5 module).
- the function block may only be configured in the sampling interval 32ms <= TA <= 255ms and only configured in the communications FP "transmit". Otherwise an entry will be made in the communications error field.

2.1.3 @CSPRO Central block PROFIBUS DP coupling

Brief description

- the function block initializes and monitors the PROFIBUS DP coupling (EXM 448/EXM 448-1).
- the function block may only be configured in the sampling interval 32ms <= TA <= 255ms. Otherwise an entry is made in the communications error field.

2.1.4 @PRODP Central block PROFIBUS DP coupling

Brief description

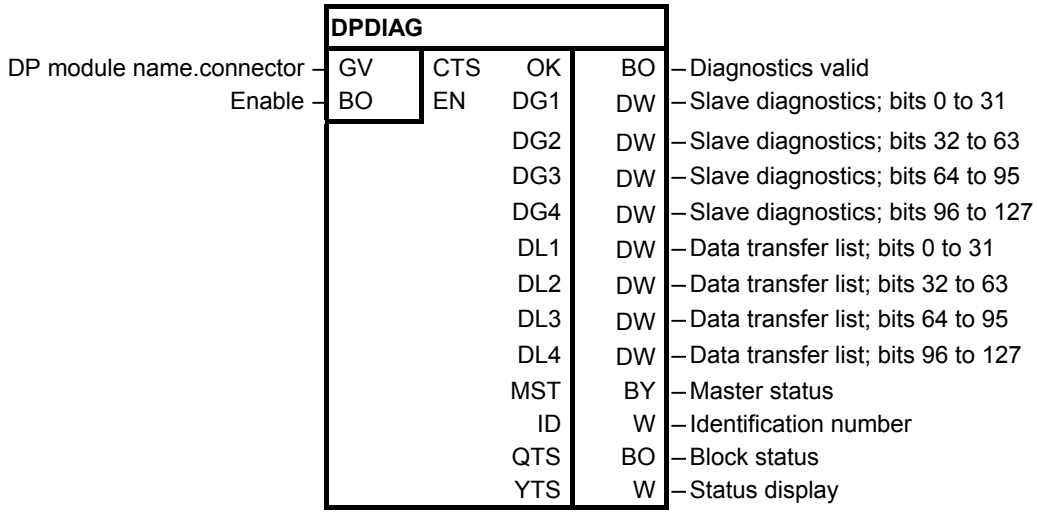
- the function block initializes and monitors the PROFIBUS DP coupling at connector X03 on FM 458-1 DP.

- the function block may only be configured in the sampling interval 32ms <= TA <= 255ms. Otherwise an entry is made in the communications error field.

2.2 Kopplung PROFIBUS DP

2.2.1 DPDIAG Diagnostics overview, PROFIBUS DP

Symbol



Brief description

The task of the **DPDIAG** function block is to provide the following information and data to the user program (i.e. the configured CFC software):

- System diagnostics (an overview of which slave had signaled diagnostics)
- Data transfer list (overview of with which slave data transfer took place within the PROFIBUS-DP time frame)
- Master status (master-specification information such as the Stop, Operate and Clear stati)

Mode of operation

The PROFIBUS-DP interface is selected using connection CTS.

The function block only enters a communications error for errors, which are detected during initialization. A communications error cannot be acknowledged and this function block is only used for diagnostics. This means, that in normal operation, a communications error is **not** entered. Only the cause of the error is signaled at output YTS.

I/O

CTS	Module name.connector of the Profibus-DP interface	(Initialization connection)
EN	Block enable The block is not processed if EN=0; output OK=0 and YTS=1; the last value is kept at the other outputs	(Default: 1)
OK	Diagnostics data valid	(Default: 0)
DG1	Overview of which slave signaled diagnostics data. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. Bit 3 of the 32 bit is, for example, assigned to the slave with Profibus address 3. Comment: The bits 0 up to and including 2 are always 0 as the associated addresses (0 to 2) should be reserved for the DP master, for a PG and an OP. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
DG2	Overview of which slave had signaled diagnostics data. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. The bit 0 of the 32-bit word is, for example, assigned to the slave with Profibus address 32. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
DG3	Overview of which slave had signaled diagnostics data. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. The bit 0 of the 32-bit word is, for example, assigned to the slave with Profibus address 64. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
DG4	Overview of which slave had signaled diagnostics data. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. The bit 0 of the 32-bit word is, for example, assigned to the slave with Profibus address 96. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
DL1	Overview of with which slave data transfer took place. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. For example, bit 3 of the 32-bit word is assigned to the slave with Profibus address 3. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)

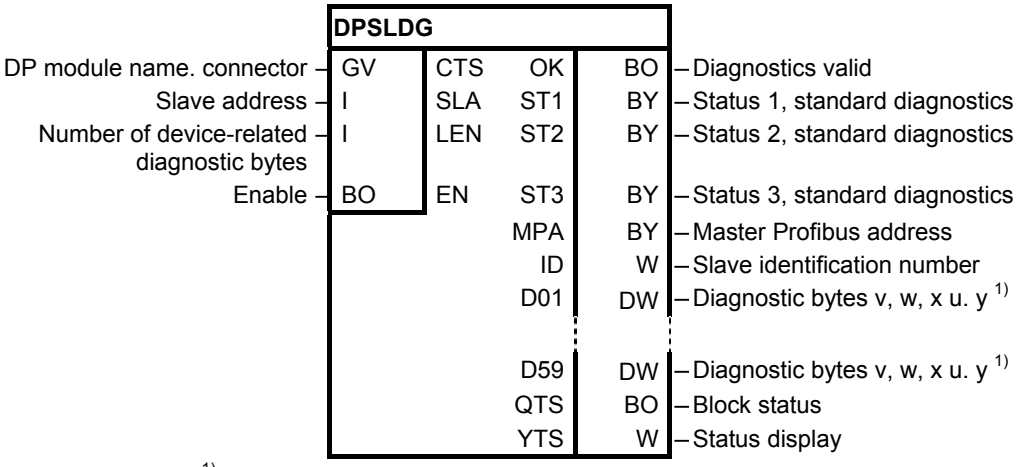
DL2	Overview of with which slave data transfer took place. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. For example, bit 0 of the 32-bit word is assigned to the slave with Profibus address 32. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
DL3	Overview of with which slave data transfer took place. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. For example, bit 0 of the 32-bit word is assigned to the slave with Profibus address 64. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
DL4	Overview of with which slave data transfer took place. This output is bit-coded. Every bit is assigned to a slave with its Profibus address. For example, bit 0 of the 32-bit word is assigned to the slave with Profibus address 96. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
MST	Status of the DP master: Stop (0x40), Clear (0x80) or Operate (0xC0)	(Default: 0)
ID	Master identification number: (0x8037 for EXM448 as Profibus interface, 0x80EB when using X3 of the FM458-1)	(Default: 0)
QTS	Block output QTS is used to display whether the block is operating error-free (QTS = 1) or was de-activated after a communications error message was entered (QTS = 0).	(Default: 0)
YTS	Detailed status display: • YTS=0 → o.k. • YTS=1 → Block processing inhibited (EN=0) For additional values at YTS, refer to: D7-SYS Online Help "Help events". (Press the F1 button in the CFC and call the topic "Help on events" under "CFC for D7-SYS".)	(Default: 0)

Configuring data

Computation time [µs]	FM458-1 DP 42,7
Can be inserted online	No
Can be configured in	Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	This function block may only be configured once for each PROFIBUS communications module.

2.2.2 DPSLDG Slave diagnostics, PROFIBUS DP

Symbol



1) normally invisible

Brief description

The **DPSLDG** function block provides diagnostics data from a DP slave to the user program. This diagnostics data correspond, with the exception of the maximum possible length, to EN 50170. According to this Standard, the diagnostics data can be a maximum of 244 bytes long. The function block supports a maximum of 240 bytes

On the EXM448, there are restrictions regarding the quantity of diagnostics data. Only diagnostics data (Standard diagnostics data) is supplied which the function block **DIAPRO** supplies.

Note

The consistency of the outputs is not ensured. When new diagnostics data is received, some of the outputs can have "New" information and some can still have "old" information.

Mode of operation

The PROFIBUS-DP interface is selected using connection CTS.

The function block only enters a communications error for errors, which are detected during initialization. A communications error cannot be acknowledged and the function block DPSLDG is only used for diagnostics. This means, that in normal operation, a communications error is **not** entered. Only the cause of the error is signaled at output YTS.

I/O

CTS	DP module name, connector of the Profibus DP interface	(Initialization connection)
SLA	Diagnostics data required from the slave with the appropriate station number (3 to 123)	(Initialization connection) (Default: 3)
LEN	Number of the device-related diagnostic bytes; this means the diagnostics bytes which extend beyond the Standard diagnostics. Here, a maximum value of 234 may be set. Whether device-related diagnostics data is available and, if yes, which significance they have, should be taken from the user documentation of the relevant DP slave.	(Initialization connection) (Default: 0, i.e. only Standard diagnostics, not device-related diagnostic bytes)
EN	Block enable. If EN=0, the block is not processed; output OK=0 and YTS=1, the last value remains at the other outputs.	(Default: 1)
OK	Diagnostics data valid	(Default: 0)
ST1	Status 1 of the diagnostics according to the Standard (byte 1). For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
ST2	Status 2 of the diagnostics according to the Standard (byte 2). For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
ST3	Status 3 of the diagnostics according to the Standard (byte 3). For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling".	(Default: 0)
MPA	Master Profibus address (byte 4 of the diagnostics according to the Standard)	
ID	Identification number of the slave (bytes 5 and 6 of the diagnosics according to the Standard)	
D01 **to** **D59**	Device-related diagnostic bytes; 4 bytes are combined in one 32-bit word. Bytes 7, 8, 9 and 10 of the diagnostics telegram can be found in D01. For a more detailed description, refer to the user manual "FM 458-1 DP", chapter "Configuring", section "PROFIBUS DP coupling". When data is entered at LEN, this has an influence on the update of the outputs. For LEN=0, these outputs are not updated. For LEN=234, D01 up to and including D59 are updated. Comment: Bytes 1 to 6 of a diagnostics telegram for PROFIBUS DP corresponds to the Standard Diagnostics; bytes from 7 onwards depend on the particular slave (referred to the particular device).	(Default: 0)
QTS	Block output QTS is used to display whether the block is operating error-free (QTS = 1) or was de-activated after a communications error message was entered (QTS = 0).	(Default: 0)

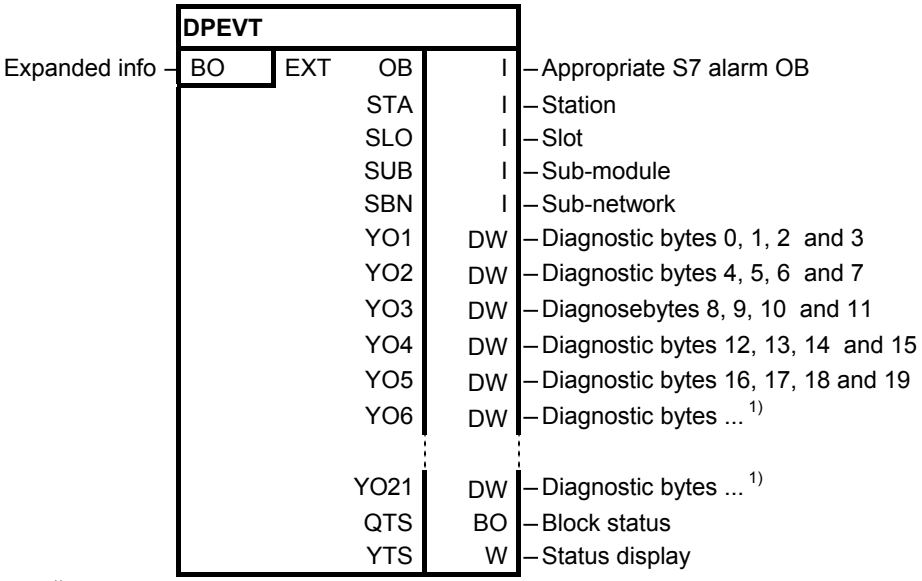
YTS	Detailed status display: • YTS=0 → o.k. • YTS=1 → Block processing inhibited (EN=0) • YTS=2 → An initialization connection (SLA er LEN) was changed in cyclic opertion; this change only becomes effective the next time that the FM458-1 starts • YTS=3 → The block has already been configured once for the slave addressed via SLA • YTS=4 → The slave, with the address specified at SLA, has not been configured in the PROFIBUS network. For additional values at YTS, refer to: D7-SYS Online Help "Help events". (Press the F1 button in the CFC and call the topic "Help on events" uncer "CFC for D7-SYS".)	(Default: 0)

Configuring data

Computation time [µs]	FM458-1 DP 29
Can be inserted online	No
Can be configured in	Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	The function block may only be configured once for each slave.

2.2.3 DPEVT Alarm information, PROFIBUS DP

Symbol


DPEVT
Expanded info
BO
EXT
OB I – Appropriate S7 alarm OB
STA I – Station
SLO I – Slot
SUB I – Sub-module
SBN I – Sub-network
YO1 DW – Diagnostic bytes 0, 1, 2 and 3
YO2 DW – Diagnostic bytes 4, 5, 6 and 7
YO3 DW – Diagnosebytes 8, 9, 10 and 11
YO4 DW – Diagnostic bytes 12, 13, 14 and 15
YO5 DW – Diagnostic bytes 16, 17, 18 and 19
YO6 DW – Diagnostic bytes ... 1)
YO21 DW – Diagnostic bytes ... 1)
QTS BO – Block status
YTS W – Status display

1) normally invisible

Brief description

The **DPEVT** function block (DP event) provides more detailed information about a Profibus-DP process or diagnostics alarm. The information/data, provided at the outputs, correspond to the information/data which a SIMATIC S7 module also has when processing the appropriate alarm OBs (e.g. OB40, OB55 etc.).

Mode of operation

When an alarm event is output, all of the values at the outputs are updated.

When the appropriate alarm occurs, the alarm task configured for this purpose, is started, Within the alarm task, DPEVT reads-out the alarm information. A new alarm of the same time is only detected again after the alarm task has been completed.

When a communications error occurs, the cause is also output at output YTS and the QTS output is set to "0".

I/O

EXT	For EXT=0, only the data/information at outputs Y01 to Y05 is updated. For EXT=1, in addition, the information/data at outputs Y06 to Y21 is updated.	(Default: 0)
OB	The number of the appropriate SIMATIC S7 organizational block (OB) is displayed at this output. In an error-free state, values 40, 55, 56, 57, 82, 83 and 86 are possible here. The actual value depends on the process alarm configured in the HWConfig for the particular alarm task.	(Default: 0)
STA	Station address of the slave which had initiated the alarm. Values of between 1 and 126 are valid values for this address.	(Default: 0)
SLO	Slot of the module which initiated the alarm. Values of between 1 and 244 are valid values for the slot data.	(Default: 0)
SUB	Sub-module of the module which initiated the alarm. Values of between 1 and 31 are valid values for the sub-module data. A value of 0 means no sub-module.	(Default: 0)
SBN	Sub-network to which the module, which initiated the alarm, is connected. Values of between 1 and 255 are valid values for the sub-network data. The number for the sub-network can be taken from the properties dialog box in NetPro or HY-Config.	(Default: 0)
YO1	The first 4 bytes with information about the last alarm event are available at this output. The actual significance corresponds to the first byte of the local data of the appropriate S7-OB. As a whole, the local data comprise 20 bytes; the structuring of the local data can be taken from the help for the appropriate OB.	(Default: 0)
YO2	The second 4 bytes with information about the last alarm event are available at this output.	(Default: 0)
YO3	The third 4 bytes with information about the last alarm event are available at this output.	(Default: 0)
YO4	The fourth 4 bytes with information about the last alarm event are available at this output.	(Default: 0)
YO5	The fifth 4 bytes with information about the last alarm event are available at this output.	(Default: 0)
Y06 to Y21	You can obtain additional information/data about the alarm, which goes beyond the local data of the S7-OBs, at these outputs. The information/data correspond to that which you would obtain if you would have called the SFB54 "RALRM" within the appropriate S7-OBs. The outputs are only updated if EXT=1 is set to 1. Normally, these outputs are switched so that they are invisible, and, when required, must be first made visible in the CFC, under the tab "I/O".	(Default: 0)
QTS	Block output QTS is used to display whether the block is operating error-free (QTS = 1) or was de-activated after a communications error message was entered (QTS = 0).	(Default: 0)
YTS	Detailed status display for additional values at YTS, refer to: D7-SYS Online Help "Help events". (Press the F1 button in the CFC and call the topic "Help on events" uncer "CFC for D7-SYS".)	(Default: 0)

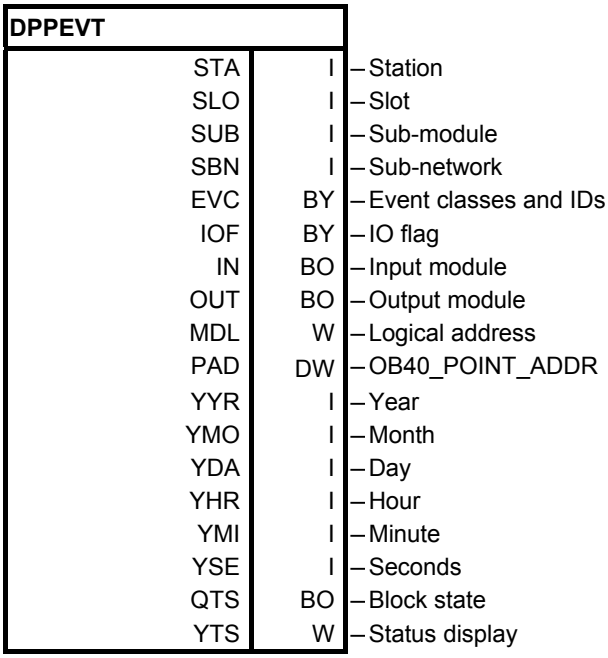
Configuring data

Computation time [µs]	FM458-1 DP 23,6

Can be inserted online	No
Can be configured in	Alarm tasks
Executed in	Initialization mode Normal mode
Special features	The DPEVT may only be configured in an alarm task for which one of the following alarm causes is configured in HW-Config: • Process alarm 1 (OB40) • DPV1 status alarm (OB55) • DPV1 update alarm (OB56) • DPV1 manufacturer-specific alarm (OB57) • Diagnostics alarm (OB82) • Withdraw/insert alarm (OB83) • Failure, subrack alarm (OB86) If this is not the case, DPEVT signals an appropriate communications error and stops processing.

2.2.4 DPPEVT Process alarm information, PROFIBUS DP Symbol

Symbol


DPPEVT
STA I – Station
SLO I – Slot
SUB I – Sub-module
SBN I – Sub-network
EVC BY – Event classes and IDs
IOF BY – IO flag
IN BO – Input module
OUT BO – Output module
MDL W – Logical address
PAD DW – OB40_POINT_ADDR
YYR I – Year
YMO I – Month
YDA I – Day
YHR I – Hour
YMI I – Minute
YSE I – Seconds
QTS BO – Block state
YTS W – Status display

Brief description

The **DPPEV** (DP process event) provides more detailed information about the Profibus DP process alarm (OB40 alarm). Contrary to the DPEVT, only selected information/data is available, but then, in a conditioned form.

Mode of operation

When an alarm event is output, all of the values at the outputs are updated.

For a communications error, the cause is additionally output at YTS and the QTS output is set to "0".

I/O

STA	Station address of the slave which had initiated the alarm. Values of between 1 to 126 are valid values for this address.	(Default: 0)
SLO	Slot of the module which initiated the alarm. Values of between 1 and 244 are valid values for the slot data.	(Default: 0)
SUB	Sub-module of the module which initiated the alarm. Values of between 1 and 31 are valid values for the sub-module data. A value of 0 means no sub-module.	(Default: 0)
SBN	Sub-network to which the module, which initiated the alarm, is connected. Values of between 1 and 255 are valid values for the sub-network data. The number for the sub-network can be taken from the properties dialog box in NetPro or HW-Config.	(Default: 0)
EVC	This output corresponds to the local data variables OB40_EV_CLASS of the OB40 for a SIMATIC-S7. A value of B#16#11(11 hexadecimal) means that the alarm is active.	(Default: 0)
IOF	This output corresponds to the local data variables OB40_IO_FLAG of the OB40 for a SIMATIC-S7. The significance is as follows: B#16#54 (54 hexadecimal) → Input module B#16#55 (55 hexadecimal) → Output module The (present) possible information is available, in a conditioned form, at outputs IN and OUT.	(Default: 0)
IN	IN=1 → Input module has initiated an alarm IN=0 → The alarm was not initiated from an input module	(Default: 0)
OUT	OUT=1 → Output module had initiated an alarm OUT=0 → The alarm was not initiated from an output module	(Default: 0)
MDL	This value outputs the logical basis address of the module. The value corresponds to the local data variables OB40_MDL_ADDR of the OB40 for a SIMATIC-S7.	(Default: 0)
PAD	This value supplies additional information about the cause of the process alarm. The value corresponds to the local data variables OB40_POINT_ADDR of the OB40 for a SIMATIC-S7. Additional information about this is provided in the SIMATIC documentation.	(Default: 0)
YYR	Year (specifies in which year the alarm was initiated)	(Default: 0)
YMO	Month (specifies in which month the alarm was initiated)	(Default: 0)
YDA	Day (specifies on which day the alarm was initiated)	(Default: 0)
YHR	Hour (specifies at which hour the alarm was initiated)	(Default: 0)
YMI	Minute (specifies at which minute the alarm was initiated)	(Default: 0)
YSE	Second (specifies at which second the alarm was initiated)	(Default: 0)
QTS	Block output QTS is used to display whether the block is operating error-free (QTS = 1) or was de-activated after a communications error message was entered (QTS = 0).	(Default: 0)

YTS	Detailed status display; for additional values at YTS, refer to: D7-SYS Online Help "Help events". (Press the F1 button in the CFC and call the topic "Help on events" uncer "CFC for D7-SYS".)	(Default: 0)

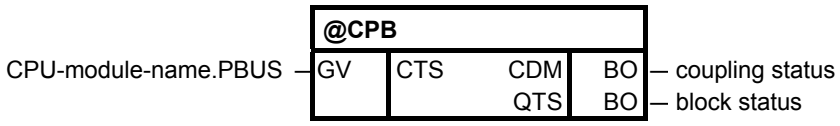
Configuring data

Computation time [µs]	FM458-1 DP 23,6
Can be inserted online	No
Can be configured in	Alarm tasks
Executed in	Initialization mode Normal mode
Special features	The DPPEV may only be configured in an alarm task for which the following alarm cause is configured in HW-Config • Process alarm 1 (OB40) If this is not the case, DPPEV signals an appropriate communications error and stops processing. A new alarm of the same time is only again detected after the alarm task has been completed.

2.3 FM 458-specific coupling

2.3.1 @CPB P-bus, central coupling block

Symbol



Brief description

The central block for the P-bus coupling can only run with an FM 458 application module.

- This function block is responsible for initializing and monitoring the P bus coupling.
- The function block can only be configured once for each application module FM 458, as there is only one P-bus coupling for each FM 458. If a function block is configured a multiple number of times, this is detected when initializing, and results in an entry in the communications error field.
- The block may only be configured in the sampling interval 32 ms <= TA <= 255 ms. Otherwise, an entry is made in the communications error field.

Mode of operation

When initializing the function block, general preparations are made to enable the coupling. The coupling is only enabled after the standard mode has been run-through (executed) several times.

After the coupling has been enabled, the central block monitors that senders and receivers are correctly registered. Further, if required, it re-organizes and updates the block output CDM at each processing cycle.

The function block cannot be used to initialize another P-bus coupling or monitor this. It can only initialize its own P-bus coupling on which CPU is configured. An entry is made in the communications error field if another module name is specified at the CTS input (other than its own).

The CDM block output provides information about the coupling status. The connection is a 1, if the coupling is enabled for general send/receive operation. The CDM block output is 0, as long as the coupling is still being initialized, or is being re-initialized (after a temporary fault).

I/O

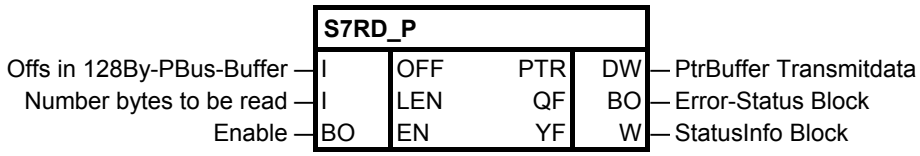
CTS	The configured name of its own CPU is specified at this initialization input.	
CDM	Specifies the coupling status (faulted = 0, not faulted = 1).	(default: 0)
QTS	Operating status of the function block There is an irreparable fault for QTS = 0, for QTS = 1, the function block operates error-free.	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 16,5
Available online	no
Can be configured in	Cyclic tasks
Executed in	Normal mode Initialization mode
Special features	-

2.3.2 S7RD_P Reading data from a SIMATIC-CPU (P Bus)

Symbol



Brief description

This block can only be used for the SIMATIC application module FM 458-1 DP.
A SIMATIC-CPU can transfer up to 128 bytes to the FM 458-1 DP in its output area of the P bus. Block S7RD_P reads this data from the P-Bus and provides it, via its pointer interface, to the read blocks (DRD…, CPY_Y) for further processing in the CFC configured software.

Mode of operation

This block operates similar to the telegram block CRV_P. A maximum of 128 bytes can be accessed via the pointer interface. These bytes are sent from the SIMATIC-CPU to the FM 458-1 DP via the P bus.
Data can be read using the read blocks (DRD…) or the copy block (CPY_P).

This block only communicates with a SIMATIC-CPU. This means that the required byte or **word swap** operations are automatically made (depending on the data type of the connected read/write blocks). The entry, which is normally required at the SW-connection of the read/write block, is not evaluated and is therefore not required.

The **computation time** essentially depends on the amount of data transferred. A base computation time of approx. 10 µs as well as approx. 1 µs/byte can be assumed as nominal value.

Associated blocks The following blocks can be connected to this block (pointer input):
DRD, DRD_8, DRD_8D, DRD_8I, DRD_BY, DRD_D, DRD_I, CPY_P

I/O

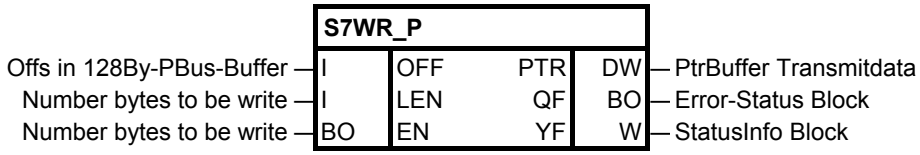
		Default:
OFF	Offs in 128By-PBus-Buffer Offset of the value to be sent within the 128 byte memory relative to the start of the buffer; max. offset: Buffer length - length of the data type	0
LEN	Number bytes to be read Number of bytes which are read by the SIMATIC-CPU via the P bus. Max. number: 128 bytes	0
EN	Enable For EN=1 at each call, the data sent from the SIMATIC-CPU (max. 128 bytes) is read.	1
PTR	PtrBuffer Transmitdata Pointer to the telegram data buffer; to connect with the same connection type of other pointer-based communication blocks. The CFC connection can be changed online. The connection also includes monitoring information to ensure correct configuring.	16#00000000
QF	Error status block QF=1: There is an error; for details, refer to YF	0.0
YF	StatusInfo Block §§ as for the DRD block!	16#0000

Configuring data

Computation time [µs]	FM 458-1 DP 10,0 + 1 for each byte
Can be inserted online	Yes
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	The block must be configured in the **same sampling time** as the blocks, connected via the pointer interface (CFC connection via connections PTR). This can only be used for the FM 458-1 DP! Several S7RD_P blocks can be configured. Although this is not a typical application, it can make sense if, for example, the 128 byte area should be read in several blocks or if data is required in different sampling times.

2.3.3 S7WR_P Sending data to a SIMATIC-CPU (P Bus)

Symbol



Brief description

This block can only be used for the SIMATIC application module FM 458-1 DP.
An FM 458-1 DP can send up to 128 bytes to the SIMATIC-CPU via the P-Bus. The block S7WR_P sends data which were previously loaded with write blocks via the pointer interface.

Mode of operation

This block operates similar to the telegram block CTV_P. A maximum of 128 bytes can be transferred via this pointer interface and via the P bus to the SIMATIC CPU. This data is previously loaded into the telegram buffer using write blocks DWR… of the copy block CPY_Y.

This block only communicates with a SIMATIC-CPU. This means that the required byte or **word swap** operations are automatically made (depending on the data type of the connected read/write blocks). The entry, which is normally required at the SW-connection of the read/write block, is not evaluated and is therefore not required.

The **computation time** essentially depends on the amount of data transferred. A base computation time of approx. 5 µs as well as approx. 0.7 µs/byte can be assumed as nominal value.

Associated blocks

The following blocks can be connected to this block (pointer input):
DWR, DWR_8, DWR_8D, DWR_8I, DWD_BY, DWR_D, DWR_I, CPY_P

I/O

		Default:
OFF	Offs in 128By-PBus-Buffer Offset of the value to be sent within the 128 byte memory relative to the start of the buffer; max. offset: Buffer length - length of the data type	0
LEN	Number of bytes to be written Number of bytes which are to be sent to the SIMATIC CPU via the P bus. Max. number: 128 bytes	0
EN	Enable For EN=1, at each call, the telegram buffer (max. 128 bytes) is sent to the SIMATIC-CPU.	1
PTR	PtrBuffer Transmitdata Pointer to the telegram/data buffer; to connect with the same connection type of other pointer-based communication blocks. The CFC connection can be changed online. The connection also includes monitoring information to ensure correct configuring.	16#00000000

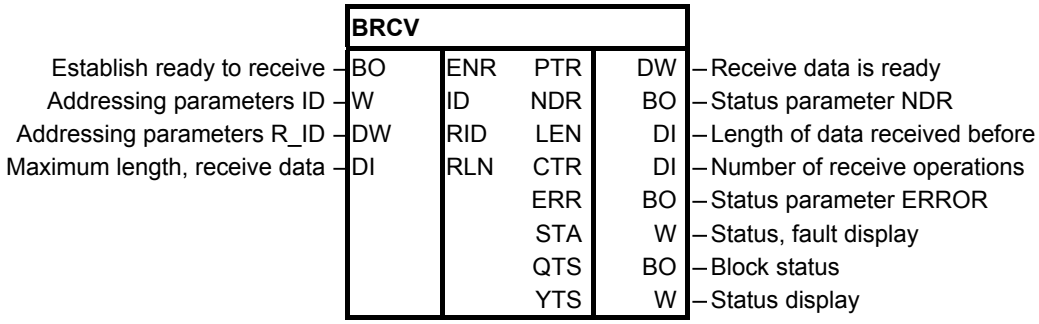
QF	Error status block QF=1: There is an error; for details, refer to YF	0.0
YF	StatusInfo Block §§ as for the DRD block!	16#0000

Configuring data

Computation time [µs]	FM 458-1 DP 5,0 + 0.7 for each byte
Can be inserted online	Yes
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	The block must be configured in the **same sampling time** as the blocks, connected via the pointer interface (CFC connection via connections PTR). This can only be used for the FM 458-1 DP! Several S7WR_P blocks can be configured. Although this is not a typical application, it can make sense if, for example, the 128 byte area should be written in several blocks or if data is required in different sampling times.

2.3.4 BRCV Block-oriented data reception via an S7 coupling

Symbol



Brief description The function block allows block-oriented data reception via a **configured S7 coupling**.

Mode of operation The BRCV block receives data from a "remote" partner. The "remote" partner is an SFB/FB, type BSEND (SFB/FB 12) on a SIMATIC S7-400 CPU.

After each data segment which has been received, an acknowledgement is sent to the partner SFB/FB and the LEN parameter is updated.

The block is ready to receive when a "1" is connected to the control input ENR. A running task can be interrupted with ENR=0.

The maximum length of the receive area is specified by the data at input RLN. The length of the data block received is displayed at output LEN.

I/O

ENR	Control parameter The block is ready to receive with ENR = 1	Default: 0
ID	Addressing parameter Reference to the local connection description (this is specified as a result of the STEP7 configured connection)	Initialization input, Default: 0
RID	The value at input RID specifies the association with the send SFB/FB. The value at the input must match the R_ID parameter for SFB/FB on the send side. This allows several SFB/FB pairs to communicate via the same logical coupling. The block pairs of a logical coupling, defined using RID or R_ID must be unique for this coupling.	Initialization input, Default: 0
RLN	The maximum length of the received data is defined here. Only values of between 0 and 65535 may be configured.	Initialization input, Default: 0
PTR	The receive data, to be evaluated by the blocks for direct communication, is made available here (e.g. types DRD, DRD_I, etc.).	Default: 0

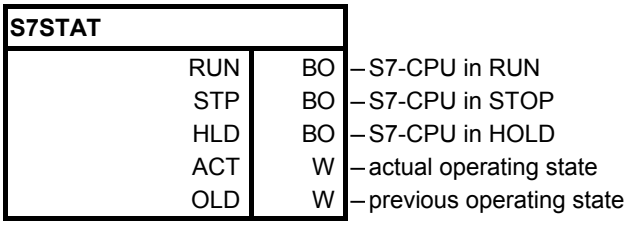
NDR	Status parameter NDR 0: Task was still not started (ENR input)or is still running 1: Task was successfully completed	Default: 0
LEN	Length of the previously received data in bytes	Default: 0
CTR	This output counts the total number of successfully complete data receive cycles since the last change from STOP to RUN.	Default: 0
ERR	An error is output at block output ERR. The detailed information about the type of the error is available at output STA. This output corresponds to the ERROR output of an SFB/FB 13 of an S7-CPU.	Default: 0
STA	Detailed status display This output corresponds to the STATUS output of an SFB/FB 13 of an S7-CPU. ERR = 0: • STA=00H No alarm, no fault • STA=11H Non-synchronous data is received, output LEN indicates the number of pieces of data previously received in bytes. ERR = 1: • STA=01H Communication problems (e.g. the coupling description to the ID not loaded, coupling has still not been established from the partner or the coupling was interrupted) • STA=04H Error regarding the data length The data block sent is longer than the receive range set using input RLN. • STA=05H Reset request received, incomplete transfer • STA=12H R_ID already exists in the coupling • STA=14H too little working memory	Default: 0
QTS	Block output QTS indicates whether the block is operating (QTS = 1) or became inactive after a communications error message was entered (QTS = 0).	Default: 0
YTS	Detailed status display • YTS=0 → O.K. (ready) • YTS=1 The block is in the DISABLED state, i.e. ENR=0 • YTS=2 The initialization connection is changed, the change only becomes effective at the next STOP → RUN transition; the FB operates with the values at ID, RID and RLN set when running-up For other values at YTS, in addition, a communications error is entered in the diagnostics buffer and the block is no longer processed (QTS=0)	Default: 0

Configuring data

Computation time [µs]	FM458-1 DP 5,7
Can be inserted online	No
Can be configured in	Alarm tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

2.3.5 S7STAT S7 CPU operating state

Symbol



Brief description The actual and previous S7-CPU operating states are displayed at the outputs.

Mode of operation The actual and previous operating state of the S7-CPU is determined and displayed at connectors ACT for the actual and OLD for the previous operating state. Output RUN is set to TRUE if the S7-CPU is either in the RUN or RUN-R state.

Output value to ACT or OLD	Operating state	RUN	STP	HLD
0x0010	Stop	0	1	0
0x0020	Cold start	0	0	0
0x0040	New start	0	0	0
0x0080	Re-start	0	0	0
0x0100	RUN	1	0	0
0x0200	RUN-R	1	0	0
0x0400	Hold	0	0	1

NOTE All other values are used for extended diagnostics.

I/O

RUN	S7-CPU in RUN	(Default: 0)
STP	S7-CPU in STOP	(Default: 0)
HLD	S7-CPU in HOLD	(Default: 0)
ACT	Actual operating state of the S7-CPU	(Default: 0x8000)
OLD	Previous operating state of the S7-CPU	(Default: 0x8000)

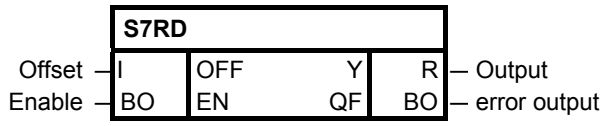
Please refer to the help for STEP7 for a more detailed description of the operating states.

Configuring data

Commutation time [µs]	FM458-1 DP
Can be inserted online	yes
Can be configured in	Alarm tasks Cyclic tasks
Executed in	Normal mode
Special features	-

2.3.6 S7RD, S7RD_B, S7RD_I, S7RD_D Read from the peripheral area of the S7-CPU

Symbol



Brief description

The function blocks, read from the peripheral area of the S7-CPU, can only run with an FM 458 application module.

The S7RD, S7RD_B, S7RD_I, S7RD_D blocks only differ by the data type at the output, which must correspond with the parameters to be read:

- S7RD: REAL
- S7RD_B: BOOL
- S7RD_I: INT
- S7RD_D: DINT

Mode of operation

With this block, data can be read into the assigned net data area of the SIMATIC S7-CPU, (periphery output) assigned to the FM 458 application module. This PE area is 128 bytes.

If the enable signal is set, the appropriate value is read from the PA area and made available at output Y.

The offset determines at which location in the PA area, the value is retrieved.

Depending on the block- or data type, the offset is specified as follows:

- for REAL data type in 4-byte steps (data length)
  value range of the offset: 0 . . . 31
- for BOOL data type in 1-byte steps (data length).
  value range of the offset: 0 . . . 127
- for INT data type in 2-byte steps (data length).
  value range of the offset: 0 . . . 63
- for DINT data type in 4-byte steps (data length).
  value range of the offset: 0 . . . 31

Output QF has the value 1, if an invalid offset was selected, or the block is not configured on the FM 458.

I/O

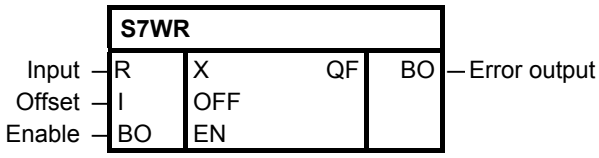
OFF	Offset	(default: 0)
EN	Enable	(default: 0)
Y	Output	(default: 0.0)
QF	Error output	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 3,3
Available online	yes
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Normal mode Initialization mode
Special features	-

2.3.7 S7WR, S7WR_B, S7WR_I, S7WR_D Write into the peripheral area of the S7-CPU

Symbol



Brief description

The function blocks, write the peripheral area (I/O) of the S7-CPU can only run with one FM 458 application module.

The S7WR, S7WR_B, S7WR_I, S7WR_D blocks differ by the data type at the input, which must correspond with the parameters to be written:

- S7WR: REAL
- S7WR_B: BOOL
- S7WR_I: INT
- S7WR_D: DINT

Mode of operation

Using this block, data can be written into the net (useful) data area of the SIMATIC S7-CPU, assigned to the FM 458 application module (periphery input). This PE area is 128 bytes. If the enable signal is set, the input value is accepted via the input and entered in the PE area.

The offset determines at which position in the PE area, the input value is saved. Depending on the block- or data type, the offset is specified as follows:

- for REAL data type in 4 byte steps (data length).
  value range of the offset: 0 . . . 31
- for BOOL data type in 1 byte steps (data length).
  value range of the offset: 0 . . . 127
- for INT data type in 2 byte steps (data length).
  value range of the offset: 0 . . . 63
- for DINT data type in 4 byte steps (data length).
  value range of the offset: 0 . . . 31

Output QF has the value 1, if an invalid offset was selected, or the block is not configured on the FM 458 application module.

I/O

X	Input	(default: 0.0)
OFF	Offset	(default: 0)
EN	Enable	(default: 0)
QF	Error output	(default: 0)

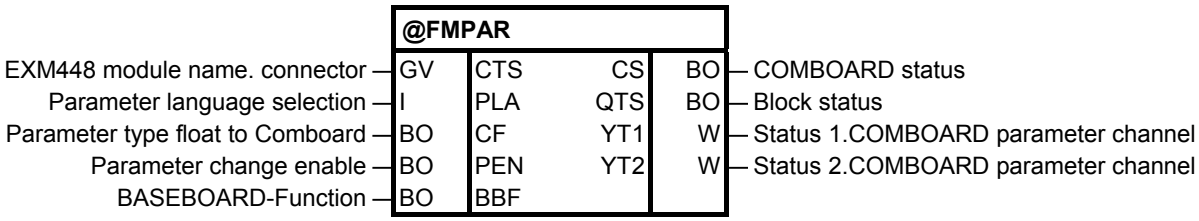
Configuringdata

Computation time [µs]	FM 458-1 DP 3,3
Available online	yes
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Normal mode Initialization mode
Special features	-

2.4 Parameterizing SIMADYN D

2.4.1 @FMPAR Parameter processing on FM 458-1 DP modules

Symbol



Brief description

The FB @FMPAR can only be configured on a FM 458-1 DP module.

FB @FMPAR monitors the COMBOARD (communications submodule of the SIMOVERT MASTER DRIVES, e.g. CBP for PROFIBUS DP) and processes the parameter tasks which are defined for it.

Several @FMPAR central blocks for various COMBOARDs can be configured on a FM 458-1 DP module.

It should be configured in a slow sampling time (approx. 100 ms). The maximum permissible sampling time is 200 ms (as a result of the monitoring using adjacent modules).

The existence and correction functioning of the COMBOARD is automatically identified and is displayed at output CS.

Only one COMBOARD may be configured using FB @FMPAR.

Parameter processing:

Parameters are configured in the comment at each I/O. If the comment starts with "@TP_", then this I/O is designated as parameter. Every parameter can be allocated a parameter name (FB-PNAME). Further, a setting parameter can also be allocated a minimum and a maximum (FB-PLIM).

Mode of operation

The block handles the following tasks:

- Checks the module code of the COMBOARD
- Monitors the COMBOARD (lifebit counter)
- Transfers the configuration data to the COMBOARD
- Processes the parameter channels
- In standard operation, processes the parameter tasks (in the sampling time cycle).

The name of the COMBOARD which is to be processed, is configured at input CTS of the FB @FMPAR. If a name has not be configured at input CTS, then the FB @FMPAR shuts itself down with an error signal at output YT1/2.

NOTE Function blocks CRV and CTV may only be configured once. They can be configured on any and on different processor modules. However, parameter processing is possible for all processor modules.

Initialization I/O:

CTS	Configured name of the EXM448 coupling module and connector X02, separated by ".". (Default: -)
CF	Parameter data type to transfer SIMADYN D data types REAL and SDTIME via the parameter channel of the COMBOARD: • CF=1: Parameter data type, float • CF=0: 32-bit integer "I4" (Default: 1)
PLA	Parameter language selection (parameter language): The parameter names are activated, which are configured at all PNAME function blocks, whose PLA input has the same value (Default: 0)

Inputs:

PEN	Enables the parameter change: • PEN=1: allows the operator control parameters to be changed through all of the parameter channels • PEN=0: inhibits operator control parameter changes via all parameter channels (Default: 1)
BBF	BASEBOARD-Function • BBF=0: SIMATIC FM 458-1 DP operates as TECHBOARD (parameter number from external view 1000..1999, 3000..3999) • BBF=1: SIMATIC FM 458-1 DP operates as BASEBOARD (parameter number from external view 0..999, 2000..2999) (Default: 0)

Status outputs:

CS	COMBOARD status: • CS=1, COMBOARD is operational. • CS=0, COMBOARD has failed or is not available. (Default: 0)

Diagnose outputs:

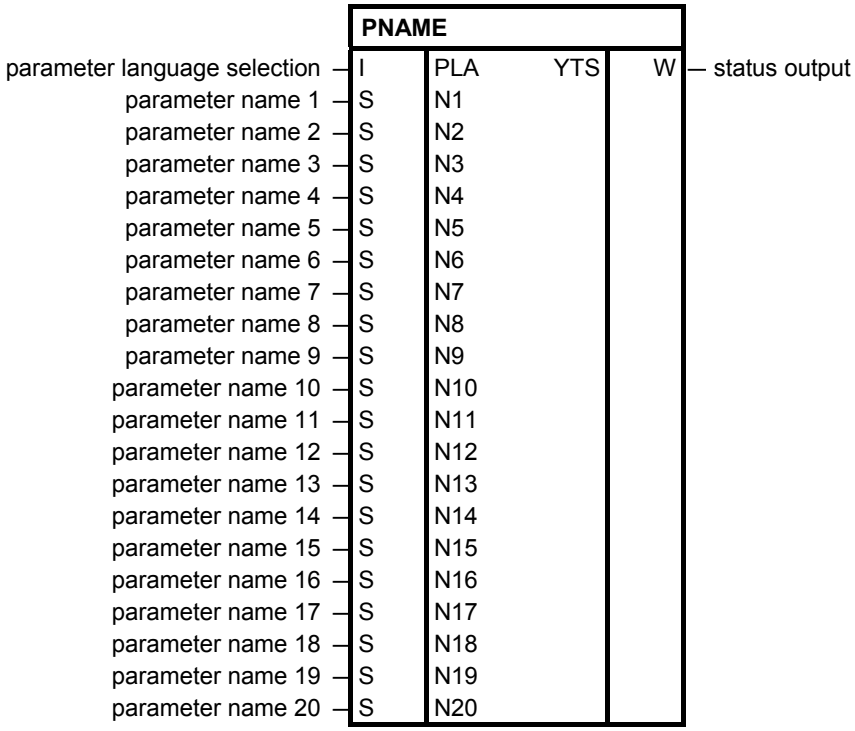
QTS	Block status: • QTS=1: Block is operational and is operating error-free. • QTS=0: Block is shutdown due to a fault with an error output at YT1/2 (Default: 0)
YT1	• YT1=0: OK status • Initialization mode: status of the block initialization • Standard mode: Status of the 1st parameter channel from COMBOARD For additional values, refer to: D7-SYS online help "Help on Events". (press the F1 key in the CFC and call-up the topic "Help on events" under "CFC for D7-SYS".) (Default: 0)
YT2	• YT2=0: OK status • Intialization module: Status of the block initialization • Standard mode: Status of the 2nd parameter channel of COMBOARD For additional values, refer to: D7-SYS online help "Help on events". (press key F1 in the CFC and call-up the topic "Help on events" under "CFC for D7-SYS".) (Default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 3,3
Can be inserted online	--
Can be configured in	Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	• 10<=sampling time<=200 ms • Block may not be switched-in or switched-out per task group.

2.4.2 PNAME Parameter names on the T400

Symbol



Brief description

The block is required to configure names for parameters.

The PNAME function block can be configured on the following modules:

- T400 technology module (@DRIVE function block is required)
- CPU module in the SIMADYN D subrack (@CSPAR function block is required)

The block can be configured in the slowest sampling time.

Mode of operation

The block saves the configured names in the parameter list of the FB-@DRIVE or @CSPAR, and then disables itself.

I/O

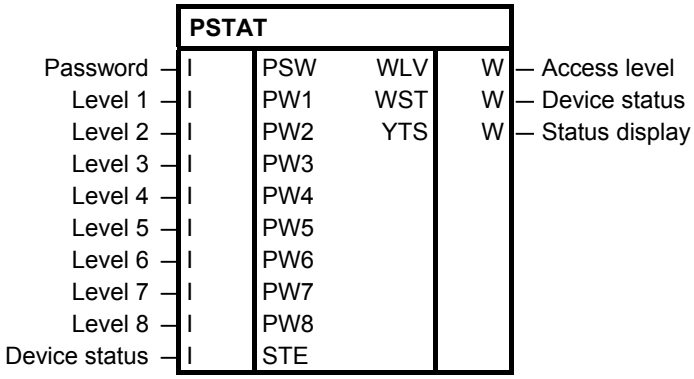
PLA	Parameter language selection (parameter langage): The configured parameter names are exactly activated when the data coincides with the PLA input at the @DRIVE or @CSPAR block. (Initialization input) (Default value: 0)
Nnn	The parameter number and the parameter name, separated by a colon are specified at the Nnn inputs. Example: "H123: parameter name". The parameter number must always consists of a letter (H or L) and three digits. The parameter name should be a maximum of 16 characters long; longer names will be cut-off and shorter names, filled with blanks. . (Initialization input) (Default value: Empty string)
YTS	Status display, possible values - 0: OK status (all of the names are activated). Alarms: - 1: The names are not activated, as another language is set at FB-@DRIVE or @CSPAR - 2: For at least one parameter number, there is no parameter (the name is ignored) Additional values, refer to: D7-SYS Online Help "Help on events" (press key F1 in the CFC and call-up the topic "Help on events" under "CFC for SIMADYN D") (Default value: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 3,3
Can be inserted online	--
Can be configured in	Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	• additionally required block on T400: @DRIVE • additionally required block on the CPU modules: @CSPAR

2.4.3 PSTAT Change enable for parameters

Symbol



Brief description

Using the function block, the following can be realized

- a current device status can be configured,
- the access level can be defined by entering a password,
- the device status and the access level is used to define whether a parameter may be changed.

The statuses and access level, in which a parameter is to be inhibited or enabled, are defined using the PLIM function block.

Function block PSTAT may only be configured once in each CPU module or T400.

I/O

PSW	Current password: If password PSW does not coincide with the PWi values, then this corresponds to access level 0: this does not permit any change. If password PSW coincides with a value of PWi, then this corresponds to access level i and all lower access levels. In access level 8, there are no access authorizations as a result of the access level (all other access restrictuions, e.g. using the device status, are retained). (Default: 0)
PWi	Appropriate password for access level i (password i): (Default: 0)
STE	Actual "device status": There are 16 statuses. Permissible entry range: 1 to 16 (Default: 1)

WLV	Actual access stage i (word level): The access stage i, determined by the entry at input PSW, is output as binary value. For access stage n, bit n is set to 1 and all of the other 15 bits, are set to 0. e.g. for access level = 7, WLVcorresponds to 2#0000000001000000. (Default: 2#0000000000000000)
WST	Device status (word state): The actual device status STE is output as a binary value. For the current device status ST=n, bit n is set to 1 and all of the other 15 bits are set to 0. e.g. for STE=7, WST corresponds to 2#000000001000000. (Default: 2#0000000000000001)
YTS	Status display: • 7C78: Function block is configured several times • 7CCA: no @DRIVE or @CSPAR function block configured • 7CF9: one or several incorrect entries were made at input PWi • 7CFA: illegal entry at input STE (Default: 0) For additional values, refer to: D7-SYS online help "Help on events". (press key F1 in the CFC and call-up the topic "Help on events" under "CFC for SIMADYN D".)

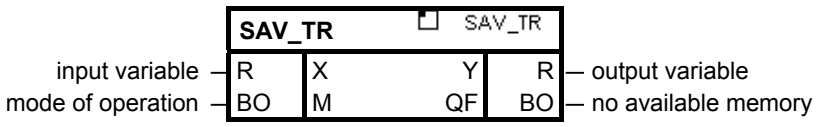
Configuringdata

Computation time [µs]	FM 458-1 DP 3,3
Can be inserted online	--
Can be configured in	Alarm-Tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	• Function block may only be configured once per CPU module or T400 • Function block additionally required on T400: @DRIVE and PLIM • Function block additionally required on the CPU modules: @CSPAR and PLIM

3 Logic blocks

3.1 SAV_TR Save FB for NOV_RAM

Symbol



Brief description

A REAL type quantity is saved in the NOV-RAM of a technology module.

Mode of operation

The function block is a read/write memory for a REAL value. It is only active, if a 0 at output QF indicates that the memory space in the NOVRAM is available. The function block operating mode is selected at input M:

Write operating mode (M = 1)

- The quantity to be saved is entered at input X. It is transferred to output Y.
- Further, input quantity X is entered in the NOV-RAM of the module. In this case, a value, already contained in the NOV-RAM is overwritten.

Read operating mode (M = 0)

- The last input quantity, saved in the **write operating mode**, is output at Y.
- The NOV-RAM is deleted from the operating system each time the configured software changes (even when the system is configured for the first time), i.e. zeros are written into it. If the NOV-RAM is then read, without having previously written a value into the NOV RAM, then the initialization value of the NOV RAM (zero) is output at Y.

INIT Operating mode

In the INIT operating mode of the function block, memory is made available to accept a REAL value. Output QF is set to 1 if this is not (no longer) possible. The function block is then inactive in the RUN operating mode.

I/O

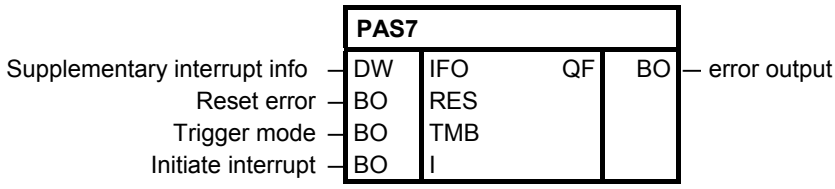
X	Input quantity	(default: 0.0)
M	Operating mode	(default: 0)
Y	Output quantity	(default: 0.0)
QF	No free memory	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 0,6
Can be inserted online	--
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

3.2 PAS7 Initiate process interrupt at the S7-CPU

Symbol



Brief description This function block, which initiates a process interrupt to the SIMATIC S7-CPU, can only run with an FM 458-1 DP application module.

Mode of operation The function block initiates a process interrupt at the associated S7 CPU.

The IFO double word is transferred to the S7-CPU as supplementary interrupt information.

NOTE

A process interrupt is only acknowledged after the process interrupt OBs (organization block) has been executed on the S7-CPU.
The block does not wait for the acknowledgment. The OB is parameterized in the HWConfig for the associated S7-CPU.

The process interrupt is only initiated, if the S7-CPU is not processing a process interrupt from the FM 458-1 DP application module.

Output QF has the value 1, if a new process interrupt is initiated, although the last process interrupt was still not acknowledged or the block was not configured on FM 458-1 DP.

Output QF has the value 0, if the acknowledgment from the S7-CPU has been received, or if input RES has the value 1.

The interrupt is initiated as a function of the input TMB:

- for TMB = 0, if a signal changes from 0 to 1 at input I, or.
- for TMB = 1, if any signal transition occurs at input I.

I/O

IFO	Supplementary interrupt information	(default: 0)
RES	Reset error	(default: 0)
TMB	Trigger mode, both edges	(default: 0)
I	Initiate an interrupt	(default: 0)
QF	Error output	(default: 0)

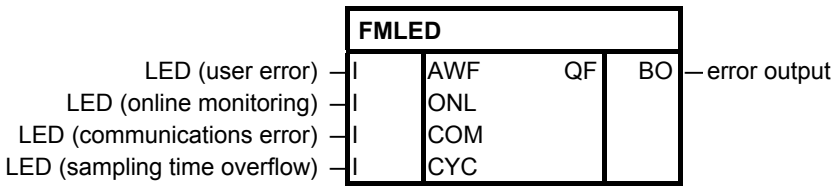
Configuringdata

Computation time [µs]	FM 458-1 DP 3,3
Available online	no
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Normal mode
Special features	-

4 Service-/diagnostic blocks

4.1 FMLED Control FM 458-1 DP diagnostics LED

Symbol



Brief description

The function block, which controls the FM 458-1 DP diagnostic LEDs, can only run with an FM 458-1 DP application module.

Mode of operation

The LEDs of the FM 458-1 DP application module can be controlled using this block.

The LED display is canceled for a value of 0 at the appropriate input; for a value of 1, it is set and for a value of -1, its status is retained, unchanged. The value of -1 is required, as this block has been configured a multiple number of times.

Output QF has the value 1, if the inputs have invalid values, or if the block is not configured on the FM 458-1 DP application module.

I/O

AWF	LED for user error	(default: -1)
ONL	LED for online monitoring	(default: -1)
COM	LED for communications error	(default: -1)
CYC	LED for sampling time overflow	(default: -1)
QF	Error output	(default: 0)

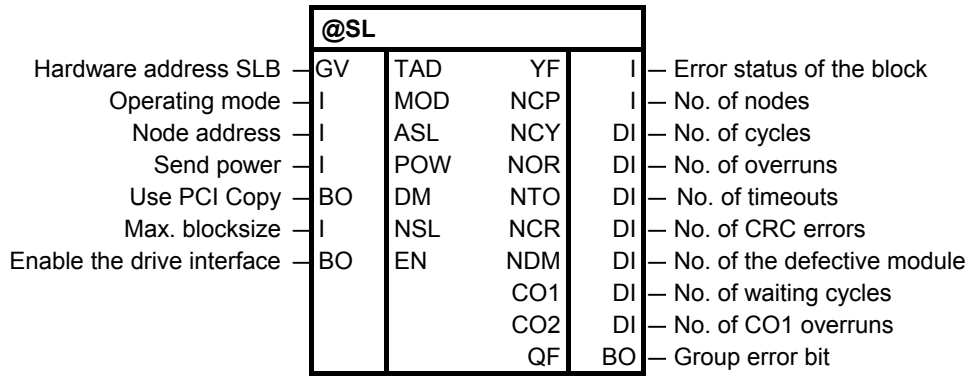
Configuringdata

Computation time [µs]	FM 458-1 DP 1,0
Available online	yes
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Normal mode Initialization mode
Special features	-

5 SIMOLINK drive coupling

5.1 @SL SIMOLINK central block

Symbol



Brief description

The @SL central block allows the initialization and monitoring of communications with an SLB module.

An SLB module is a system hardware component, which can be an ITSL-, an EXM 448-1 module or an optional SLB (**S**IMO**L**INK **B**oard) of the ITSL module.

The @SL central block may only be configured in a cyclic task and once per SIMOLINK ring.

The following parameters must be set for an SLB module:

- Hardware address SLB (TAD)
- Operating mode (MOD)
- Node address (ASL), only relevant when operating mode 0 is selected
- Send power (POW) for the SLB module

Mode of operation

1. The @SL central block executes the following steps while the system is being initialized:
   - Checks the validity of the value ranges at the input connections
   - Checks whether additional @SL central blocks have been configured at the same hardware address (input TAD)
   - Initializes the SLB module corresponding to the data at the initialization connections

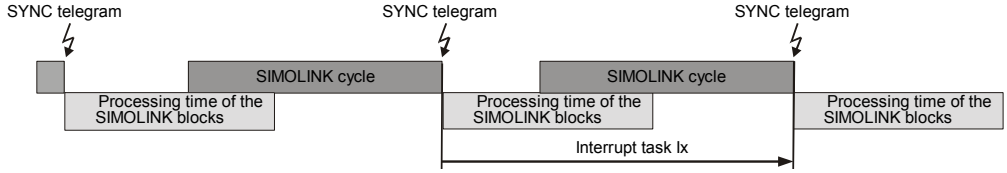
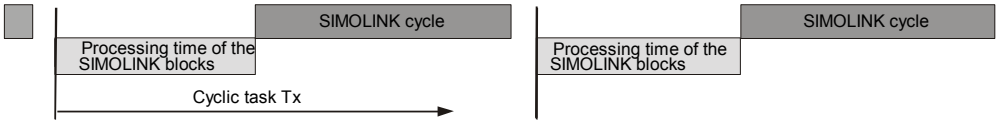
- Sends an initialization sequence (SIMOLINK) and monitors the starting sequence

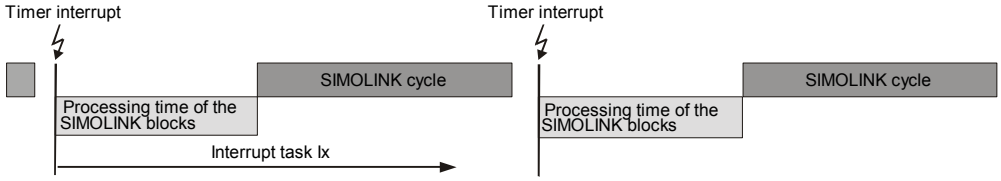
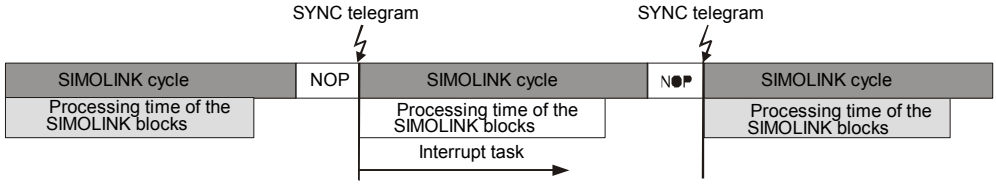
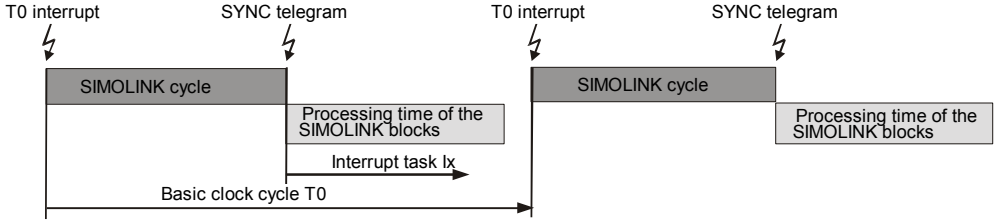
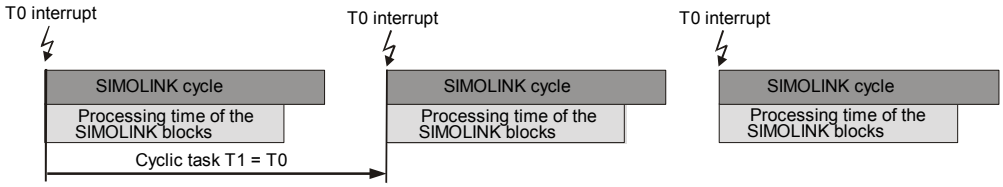
2. The @SL central block executes, in the standard mode ("RUN“ operating status) of the system, the following operating steps:
   - Monitors communications of the SIMOLINK drive interface
   - Outputs fault messages when communication faults occur at the outputs
   - Outputs information about the drive coupling
   - New values for the node address (ASL) and send power (POW) are only transferred after the SIMOLINK drive coupling restarts.

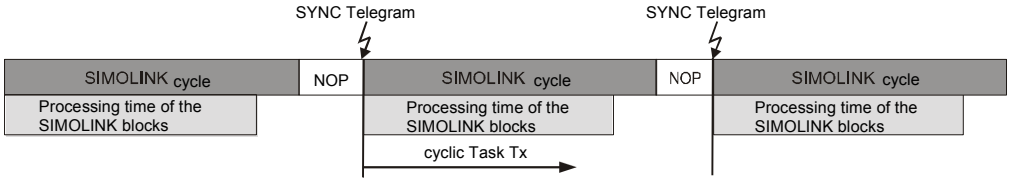
Operating mode

An SLB module can be initialized and can operate in 6 different operating modes.

When configuring, the different time characteristics of the SIMOLINK blocks for the selected operating modes at input MOD.

0	**Slave mode** The SLB module operates as slave. The SIMOLINK blocks in the CFC chart must be configured in an interrupt task Ix (x=1 . . . 8). Timing: an interrupt is initiated each time a SYNC telegram is received, and therefore starts execution of interrupt task Ix. The received values are read and the values to be sent are written into the write buffer of the SLB module. 
1	**Asynchronous mode** The SLB module operates as master. The SIMOLINK blocks in the CFC chart must be configured in a cyclic task Tx (x=1 . . . 5). Timing: The blocks are executed each time cyclic task Tx starts. The SIMOLINK telegrams are sent after the last SIMOLINK block has been calculated. 

2	**Timer mode** The SLB module operates as master. The SIMOLINK blocks in the CFC chart must be configured in an interrupt task Ix (x=1 . . . 8). Timing: A timer of the ITSL/EXM 448-1 module initiates, corresponding to the equivalent sampling time, an interrupt, and therefore execution of interrupt task Ix. The SIMOLINK telegrams are sent after the last SIMOLINK block has been calculated. 
3	**Automatic mode** The SLB module operates as master. The SIMOLINK blocks in the CFC chart must be configured in an interrupt task Ix (x=1 . . . 8). Timing: Each SYNC telegram which is received, initiates an interrupt, and therefore execution of the interrupt task Ix. The SIMOLINK bus cycle is automatically re-initiated each time a SYNC telegram is received. SIMOLINK telegrams are sent and received in parallel with the signal processing (internal calculations). 
4	**External mode** The SLB module operates as master. The SIMOLINK blocks in the CFC chart must be configured in an interrupt task Ix (x=1 . . . 8). Timing: The bask clock cycle T0 from the system initiates that telegrams are sent, and therefore the start of the SIMOLINK cycle. A subsequently received SYNC telegram initiates an interrupt and therefore execution of interrupt task Ix. The signal processing (internal calculations) are realized after the SIMOLINK telegram has been sent and received. 
5	**External cyclic mode** The SLB module operates as master. The SIMOLINK blocks in the CFC chart must be configured in a cyclic task T1=T0. Timing: The basic clock cycle T0 initiates that telegrams are sent (starts the SIMOLINK cycle) and the SIMOLINK blocks are processed in T1=T0. The signals are processed (internal calculation) at the same time as sending and receiving SIMOLINK telegrams. 

10	**Cyclic-automatic-mode 10** The cyclic-automatic-mode 10 offers the advantage to place the function block configuration in cyklic tasks, in opposed to mode 3. 

NOTE It is necessary to set interrupt task sources for operating modes 0, 2, 3, 4 and 10, in order to initiate the configured interrupt tasks. The settings must be made in the HWConfig in the properties window under the "Interrupt tasks" tab. They are dependent on the configured hardware components.

interrupt task settings

Operating mode	Interrupt source to be set for the interrupt task Ix of the SIMOLINK blocks, if:			
	first SLB module at slot 1	**first SLB module at slot 2**	**second SLB module at slot 1**	**second SLB module at slot 2**
0	LE bus interrupt 1	LE bus interrupt 3	LE bus interrupt 2	LE bus interrupt 4
2	LE bus interrupt 5	LE bus interrupt 6	LE bus interrupt 7	LE bus interrupt 8
3	LE bus interrupt 1	LE bus interrupt 3	LE bus interrupt 2	LE bus interrupt 4
4	LE bus interrupt 1	LE bus interrupt 3	LE bus interrupt 2	LE bus interrupt 4

NOTE The first SLB module can be an EXM 448-1- or an ITSL module without optional SLB. The settings for the second SLB module are only relevant for an ITSL module with optional SLB.

I/O

TAD	Hardware address SLB (name of the SLB module), which can be configured in HWConfig.	
MOD	Operating mode Sets the required operating mode	(default: 0)
ASL	Node address Address of the slave (1 . . . 200) in the SIMOLINK ring (this is only relevant, if operating mode 0 was selected at MOD)	(default: 0)
POW	Send power Send power of the SLB module (if a lower send power is used, the aging processing of the fiber-optic cables is slowed down and errors in the medium can be more easily identified at start-up). Value range: 1 . . . 3 (small, medium large);	(default: 3)
DM	Use PCI Copy 1 = Data with PCI Copy read 0 = Data normal read	(default: 0)
NSL	max. blocksize Max. blocksize for a PCI Copy block	(default: 15)
EN	Bus enable Start/stop of the SLB module for telegram data transfer EN=0 no telegrams are sent EN=1 telegrams are sent corresponding to the selected operating mode	(default: 1)
YF	Error status of the block YF=0 No error, YF > 0 refer to coded error output	(default: 0)
NCP	Number of nodes Number of nodes in the SIMOLINK ring (including SL master)	(default: 0)
NCY	Number of cycles Number of SIMOLINK cycles which have been executed or the number of SIMOLINK telegrams	(default: 0)
NOR	Number of overruns The number of statuses, where the configured function blocks have not be able to provide the data or retrieve the data up to the start of the next SIMOLINK cycle. The data remains consistent, even for errors such as these and the SIMOLINK cycle is started with old data. In order to resolve this problem, the interrupt tasks, in which the SIMOLINK blocks were configured, must be relieved.	(default: 0)
NTO	No. of timeouts on the SIMOLINK ring A timeout means that a telegram has failed (not been received).	(default: 0)
NCR	Number of CRC errors in the SIMOLINK ring A node sends a telegram with a CRC error.	(default: 0)
NDM	Number of the defective module and/or node that detected the fault in the line.	(default: 0)
CO1	No. of waiting cycles The number of the processor cycles specifies while the values by PCI Copy are being waited for.	(default: 0)
CO2	No. of CO1 Overruns	(default: 0)
QF	Group error bit QF=0 No error, QF=1 for error (if YF≠0)	(default: 0)

coded error output

Error statuses which occur for the appropriate block are output in a coded form at outputs YF of the SIMOLINK blocks. Only the last error event is displayed.

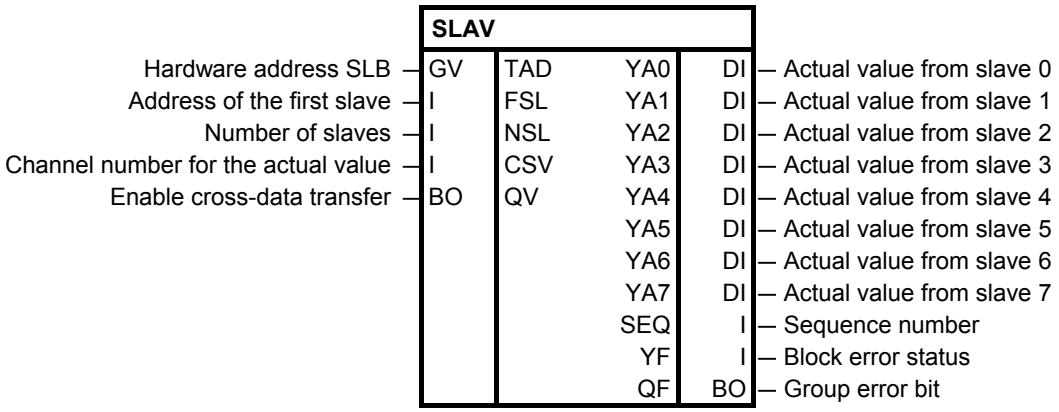
Value	Significance
2	TAD input is incorrectly connected
3	SLB module not inserted or hardware defective
4	SLB module is already being used by another central block @SL
5	Memory problem
6	Central block @SL not configured
7	No SIMOLINK block available
8	Memory register was not set-up
9	Software does not support the hardware combination
10	Block must be configured in an interrupt task
11	Block must be configured in a cyclic task
12	Block must be configured in a cyclic task with TX=T0
13	Equivalent sampling time must be equal to T0
14	Interrupt source for the alarm task is incorrect
15	Blocks must be configured in the same sampling time
16	Operating mode is (still) not supported
17	Node address at input ASL is too high
18	No send- and receive blocks available
19	Maximum number of SIMOLINK telegrams (max. 1021 net telegrams) exceeded → increase SIMOLINK cycle time or configure fewer SIMOLINK blocks
20	Slave address too high
21	Channel number too high
22	Slave attempts to write to the incorrect address
23	Cross-data transfer is only possible in one direction per slave (sending or receiving)
30	Physical data transfer along the SIMOLINK ring is faulted → increase the send power at one of the partial segments, or the fiber-optic cable medium or connector is defective
31	CRC error (check sum error)
32	Timeout error in the SIMOLINK ring
33	Only for MOD=0: signaled SIMOLINK cycle time (in the special telegram from the SL master) does not correspond to the configured equivalent sampling time

Configuringdata

Computation time [µs]	FM 458-1 DP 69,3
Can be inserted online	No
Can be configured in	Cyclic task
Executed in	Initialization mode Normal mode
Special features	-

5.2 SLAV, SLAVE_R SIMOLINK receive block for one actual value

Symbol



Brief description

A max. of 8 actual values can be transferred from max. 8 slaves using the SLAV receive block. Each slave can only receive one actual value, and for all of the slaves, only the same channel number is addressed.

The SLAVE and SLAVE_R function blocks are functionally identical. The only difference is the data type of the actual value connections YA0 to YA7:

SLAVE:	DINT
SLAVE_R:	REAL

Mode of operation

1. The SLAV function block executes the following steps while the system is being initialized
   - Checks the task assignment,
   - Initializes the task list of the SLB module corresponding to the data configured at the inputs
2. In the normal system mode ("RUN“ operating status), the SLAV function block executes the following steps:
   - Checks that the inputs are within the permissible value range
   - Reads-out the actual values to be received from the receive buffer of the SLB module#

I

I/O

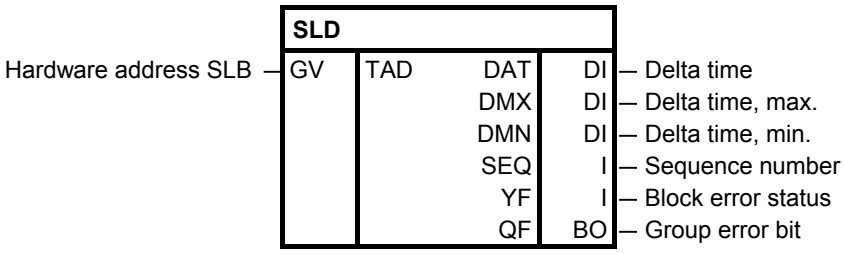
TAD	SLB hardware address (name of the SLB module), which can be configured in HWConfig	
FSL	Address of the first slave from which the actual value YA0 should be received, value range 1 . . . 200	(default: 1)
NSL	No. of slaves, from which actual values are to be received, value range 1. . . 8	(default: 1)
CSV	Channel number on which the actual value is received, value range 0 . . . 7	(default: 0)
QV	Enable cross-data transfer This is used, if data is to be sent to a slave in the same cycle which is physically located in front in the SIMOLINK ring (e.g. from slave 4 to slave 1).	(default: 0)
YA0 to YA7	Actual value YA from slaves 1 to 8 A maximum of 8 actual values can be received.	(default: 0)
SEQ	Sequence number Number of the block in the SIMOLINK block sequence The value supplies info as to whether the block was correctly initialized.	(default: 0)
YF	Error status of the block YF=0 no error, YF > 0 refer to coded error output @SL	(default: 0)
QF	Group error bit QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 34,7
Can be inserted online	No
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

5.3 SLD SIMOLINK delta evaluation

Symbol



Brief description A sampling time failure can be detected using function block SLD. The counter status is interrogated at each SYNC interrupt (this is generated at the end of every telegram cycle). The block can calculate and output the difference to the old (previous) value.

Mode of operation The blocks reads the interrogated value of the counter and generates the difference to the value which was saved in the old (previous) cycle. This value is output at DT.
The minimum and maximum values of DT are kept for monitoring purposes.

I/O

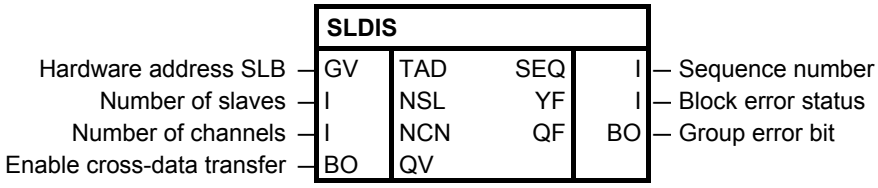
TAD	SLB hardware address (name of the SLB module), which can be configured in HWConfig	
DT	Delta time Difference to the last SIMOLINK cycle duration	(default: 0)
DMX	Delta time, max. Maximum value of DT	(default: 0)
DMN	Delta time, min. Minimum value of DT	(default: 0)
SEQ	Sequence number Number of the block in the SIMOLINK block sequence This value provides information as to whether the block was correctly initialized.	(default: 0)
YF	Error status of the block YF=0 no error, YF > 0 refer to coded error output @SL	(default: 0)
QF	Group error bit QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 19,8
Can be inserted online	No
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

5.4 SLDIS SIMOLINK dispatcher

Symbol



Brief description A dispatcher mode is prepared in-line with the SIMOLINK specifications (as for MASTERDRIVES drive converters) using the SLDIS function block.

Mode of operation The block registers the telegrams for all NSL slaves and all NCN channels.

I/O

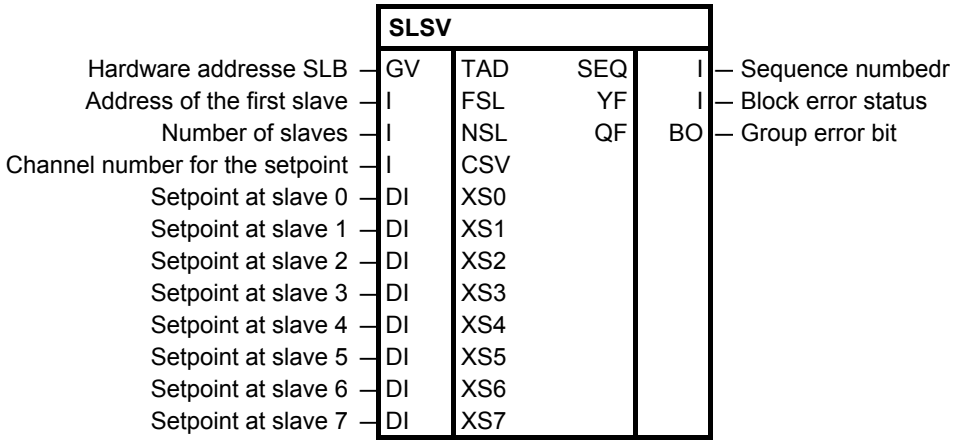
TAD	Hardware address SLB (name of the SLB module), which can be configured in HWConfig	
NSL	Number of all of the slaves in the SIMOLINK ring	(default: 1)
NCN	Number of all of the channels	(default: 1)
QV	Enable cross-data transfer This is used, if data are to be sent to a slave in the same cycle, which is located physically in front in the SIMOLINK ring (e.g. from slave 4 to slave 1).	(default: 0)
SEQ	Sequence number Number of the block in the SIMOLINK block sequence This value provides information as to whether the block was correctly initialized.	(default: 0)
YF	Error status of the block YF=0 no error, YF > 0 refer to coded error output @SL	(default: 0)
QF	Group error bit QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 14,7
Can be inserted online	No
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

5.5 SLSV, SLSV_R SIMOLINK send block for one setpoint

Symbol



Brief description

A maximum of 8 setpoints can be transferred to a maximum of 8 slaves using the SLSV send block. Only one setpoint can be sent to each slave, and for all of the slaves, only the same channel number can be addressed.

The SLSV and SLSV_R function blocks are functionally identical. The only difference is the data type of the setpoint connections XS0 to XS7:

SLSV:	DINT
SLSV_R:	REAL

Mode of operation

1. The SLSV send block executes the following steps while the system is being initialized:
   - Checks the task assignment
   - Initializes the task-list of the SLB module corresponding to the data configured at the inputs
2. In the normal system mode ("RUN" mode), the SLSV send block executes the following:
   - Calculates the setpoints
   - Checks that the inputs are within the permissible value ranges
   - Enters the setpoints to be sent into the write buffer of the SLB module

I/O

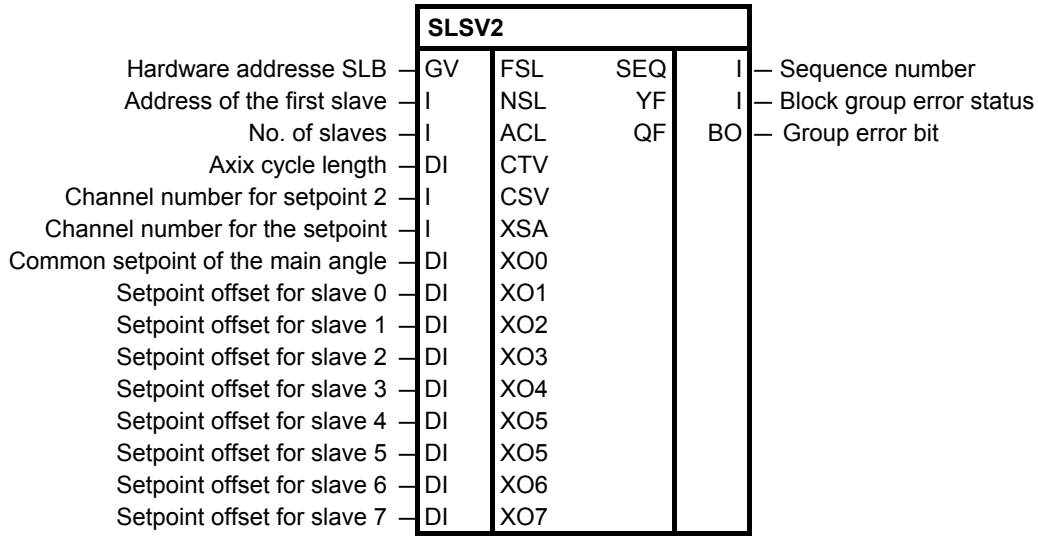
TAD	Hardware address SLB (name of the SLB module), which can be configured in HWConfig	
FSL	Address of the first slave to which setpoint XS0 should be sent, value range 1 . . . 200	(default: 1)
NSL	Number of slaves to which the setpoint should be sent, value range 1. . . 8	(default: 1)
CSV	Number of the channel on which the setpoint is sent, value range 0 . . . 7	(default: 0)
XS0 **to** **XS7**	Setpoint XS for slaves 1 to 8, A maximum of 8 setpoints can be sent.	(default: 0)
SEQ	Sequence number Number of the blocks in the SIMOLINK block sequence This value provides information as to whether the block was correctly initialized.	(default: 0)
YF	Error status of the block YF=0 no error, YF > refer to coded error output @SL	(default: 0)
QF	Group error bit QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 34,7
Can be inserted online	No
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

5.6 SLSV2, SLSV2_R SIMOLINK send block for 2 setpoints

Symbol



Brief description

2 setpoints can be sent to each slave using the SLSV2 send block. In this case, the block can handle a maximum of 8 slaves. The first setpoint is transferred to all of the 8 slaves.

This functionality can be used to implement a virtual shaft, especially if the time and the position/angular setpoint must be transferred to the slaves.

The SLSV2 and SLSV2_R function blocks are functionally identical. The only difference is the data type of the setpoint connections XO0 to XO7:

SLSV2: DINT
SLSV2_R: REAL

Mode of operation

1. The SLSV2 send block executes the following steps while the system is being initialized:
   - Checks the task assignment
   - Initializes the task list of the SLB module corresponding to the data configured at the inputs
2. In the normal system mode ("RUN" mode), the SLSV2 send block executes the following steps:
   - Calculates the setpoints
   - Checks that the inputs are within the permissible value ranges
   - Enters the setpoints to be sent into the write buffer of the SLB module

I/O

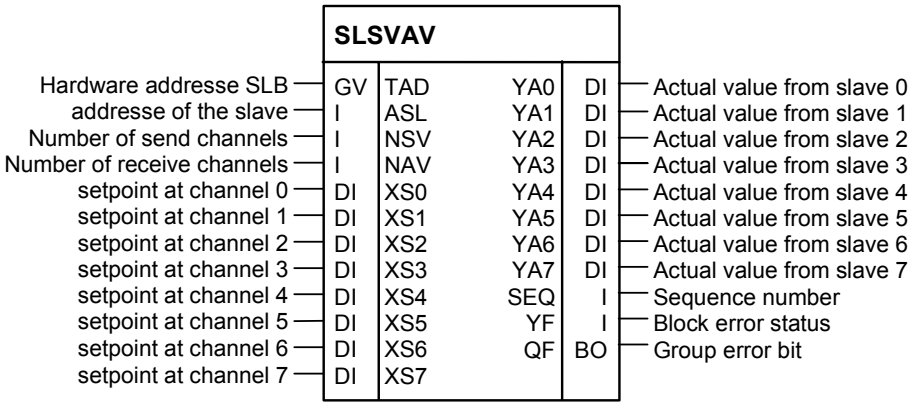
TAD	Hardware address SLB (name of the SLB module), which can be configured in HWConfig	
FSL	Address of the first slave to which setpoint XO0 should be set, value range 1 . . . 200	(default: 1)
NSL	Number of slaves to which the setpoint should be sent, value range 1. . . 8	(default: 1)
ACL	Axis cycle length Upper integrator limit value	(default: 0)
CTV	Channel number for setpoint 2, value range 0 . . . 7	(default: 0)
CSV	Number of the channel on which the setpoint is sent, Value range 0 . . . 7	(default: 0)
XSA	Common setpoint XS of the main angle/position for all NSL slaves	(default: 0)
XO0 to XO7	Setpoint offset XO for slaves 1 to 8, A maximum of 8 setpoint offsets can be sent.	(default: 0)
SEQ	Sequence number Number of the block in the SIMOLINK block sequence This value provides information as to whether the block was correctly initialized.	(default: 0)
YF	Error status of the block YF=0 no error, YF > 0 refer to coded error output @SL	(default: 0)
QF	Group error bit QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)

Configuringdata

Computation time [µs]	FM 458-1 DP 39,6
Can be inserted online	No
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

5.7 SLSVAV SIMOLINK send and receive block for one slave

Symbol



Brief description

A maximum of

- 8 setpoints and
- 8 actual values

can be transfered to and from one slave. The number of addressed channels for the setpoints and the actual values is configured at the inputs.

Mode of operation

1. The SLSVAV send and receive block executes the following steps while the system is being initialized:
   - Checks the task assignment
   - Initializes the task-list of the SLB module corresponding to the data configured at the inputs
2. In the normal system mode ("RUN" mode), the SLSVAV send and receive block executes the following:
   - Checks that the inputs are within the permissible value range
   - Enters the setpoints to be sent into the write buffer of the SLB module
   - Reads-out the actual values to be received from the receive buffer of the SLB module

I/O

TAD	Hardware address SLB (name of the SLB module), which can be configured in HWConfig	
ASL	Address of the slave for dataexchange, value range 1 . . . 200	(default: 1)
NSV	Number of channels for the setpoint to be sent, value range 0. . . 8	(default: 0)
NAV	Number of channels for the actual values to be received, value range 0 . . . 8	(default: 0)
XS0 to XS7	Setpoint XS for channel 0 to 7, A maximum of 8 setpoints can be sent.	(default: 0)
YS0 to YS7	Actual values YS from channel 0 to 7, A maximum of 8 actual values can be received.	(default: 0)
SEQ	Sequence number Number of the blocks in the SIMOLINK block sequence This value provides information as to whether the block was correctly initialized.	(default: 0)
YF	Error status of the block YF=0 no error, YF > 0	(default: 0)
QF	Group error bit QF=0 no error, QF=1 for error (if YF≠0)	(default: 0)

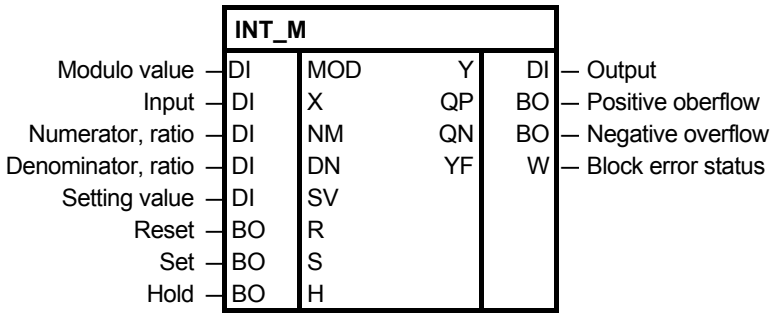
Configuringdata

Computation time [µs]	FM458 / PM6 34,7
Can be inserted online	no
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

6 Closed-loop control blocks

6.1.1 INT_M Modulo integrator for axis cycle correct integration

Symbol



Brief description

the virtual master block INT_M is used to generate position reference values in angular synchronism.

Mode of operation

The block sums the input values X, weighted with ratio NM and DN.

If the sum of the modulo value MOD exceeds or falls below 0, the modulo value is subtracted or added, and an overflow bit QP or QN is set for the duration of the sampling time.

I/O

MOD	Modulo value, value range 1 . . . 2^{30}	(default: 0)
X	Input quantity of the integrator e.g. velocity (ramp-function generator output)	(default: 0)
NM	Numerator value for the ratio (gearbox factor) NM ∗ X may not exceed 2^{31}, value range: -2^{30} to $+2^{30}$	(default: 1)
DN	Denominator value for the ratio (gearbox factor), value range: -2^{30} to $+2^{30}$	(default: 1)
SV	Setting value Is the value which is set to the output Y with S=1.	(default: 0)
R	Reset R=1 → Y=0	(default: 0)
S	Setting Bit to set the output value Y to the setting value SV S=1 → Y=SV (initial offset)	(default: 0)
H	Hold Holds the instantaneous value at output Y H=1 → Y=Y_{old}	(default: 0)

Y	Output quantity of the integrator R=S=H=0 → Y=Y_{old}+X∗NM/DN	(default: 0)
QP	Positive overflow QP=1 → Y + X ≥ MOD (Y=Y-MOD)	(default: 0)
QN	Negative overflow QN=1 → Y+X < 0 (Y=Y+MOD)	(default: 0)
YF	Error status of the block YF=0 no error, YF > 0 coded error output	(default: 0)

Coded error output

The error status is output in a coded form at output YF of the modulo integrator INT_M. The last error event is always displayed.

Value	Significance
1	MOD > 2^{30} or < 1
4	Division overflow, positive
8	Division overflow, negative
16	Overflow, rest positive
32	Overflow, rest negative

Configuringdata

Computation time [µs]	FM 458-1 DP 19,8
Can be inserted online	Yes
Can be configured in	Interrupt tasks Cyclic tasks
Executed in	Initialization mode Normal mode
Special features	-

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